INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H03M13/27

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H03M   H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SHIN M-C ET AL: "PROCESSOR-BASED TURBO INTELEAVER FOR MULTIPLE THIRD-GENERATION WIRELESS STANDARDS" IEEE COMMUNICATIONS LETTERS, IEEE SERVICE CENTER, PISCATAWAY,US, US, vol. 7, no. 5, May 2003 (2003-05), pages 210-212, XP001166306 ISSN: 1089-7798	1-4,8, 10-12
A	abstract page 210 - page 211	5-7,9

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| X | Further documents are listed in the continuation of box C. | | X | Patent family members are listed in annex. |

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 April 2005	02/05/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Burkert, F

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	"3RD GENERATION PARTNERSHIP PROJECT (3GPP); TECHNICAL SPECIFICATION GROUP RADIO ACCESS NETWORK MULTIPLEXING AND CHANNEL CODING (FDD); TS 25.212 V5.1.0" ETSI STANDARDS, EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE, June 2002 (2002-06), pages 17-20, XP002324890 SOPHIA-ANTIPOLIS, FRANCE page 19	1-12
A	US 2002/159423 A1 (YAO IWEN ET AL) 31 October 2002 (2002-10-31) abstract paragraphs '0113! - '0143!, '0163!	1-12
A	AMPADU P ET AL: "An efficient hardware interleaver for 3G turbo decoding" PROC. OF RADIO AND WIRELESS CONFERENCE 2003, PISCATAWAY, NJ, USA, 10 August 2003 (2003-08-10), pages 199-201, XP010656732 ISBN: 0-7803-7829-6 page 199	1-12
A	US 2002/119803 A1 (BITTERLICH STEFAN JOHANNES ET AL) 29 August 2002 (2002-08-29) abstract paragraphs '0027! - '0071!, '0100! - '0115!, '0148! figure 1	1-12
A	EP 1 195 910 A (SAMSUNG ELECTRONICS CO., LTD) 10 April 2002 (2002-04-10) the whole document	1-12

	Intern	Application No
	PCT/IB2004/004319	

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 2002159423	A1	31-10-2002	BR	0207669 A	01-02-2005
			CA	2439573 A1	06-09-2002
			CN	1494770 A	05-05-2004
			EP	1384328 A2	28-01-2004
			JP	2004531116 T	07-10-2004
			MX	PA03007710 A	16-03-2004
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US 2002119803	A1	29-08-2002	EP	1410513 A1	21-04-2004
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EP 1195910	A	10-04-2002	KR	2002025477 A	04-04-2002
			EP	1195910 A2	10-04-2002
			JP	2002190743 A	05-07-2002
			US	2002091900 A1	11-07-2002

AMENDED CLAIMS

[received by the International Bureau on 4 July 2005 (04.07.05);
original claims 1-12 replaced by new claims 1-21 (5 pages)]

1. An interleaver for a turbo encoder and decoder comprising a first table populated with a first set of parameters to allow intra-row permutation of data within an array in accordance with a first wireless communication standard when operation in the first wireless communication standard is required and a second table populated with a second set of parameters to allow inter-row permutation of the data in accordance with the first wireless communication standard when operation in the first wireless communication standard is required wherein the first table is populated with a third set of parameters to allow intra-row permutation of data within an array in accordance with a second wireless communication standard when operation in the second wireless communication standard is required and to populate the second table with a fourth set of parameters to allow inter-row permutation of the data in accordance with the second wireless communication standard when operation in the second wireless communication standard is required, and wherein the interleaver further comprises a buffer arranged to compare received interleaved addresses with the size of the data array and to store valid addresses.; and wherein the buffer is arranged to control the flow of data into the interleaver, such that when a predetermined number of addresses have been stored in the buffer the buffer stops the flow of data into the interleaver to allow the outputting of addresses from the buffer to be performed at substantially a constant rate.

2. An interleaver according to claim 1, wherein the first wireless communication standard is the family of WCDMA standards within 3GPP.

AMENDED SHEET (ARTICLE 19)

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    3. An interleaver according to claim 1 or 2, wherein the second wireless communication standard is the family of WCDMA standards within 3GPP2.

10   4. An interleaver according to claim 3, wherein the parameters populated in the first table are $(R_j)\bmod(p')$, where j is the row number for the data array, R_j is a row specific prime number for the array and p' corresponds to a selected prime number minus 1 for the 3GPP standard and the total number of columns within the data array for 15   3GPP2.

    5. An interleaver according to any preceding claim, wherein the parameters populated in the second table are inter-row permutation sequences multiplied by column numbers associated with the data 20   array.

    6. An interleaver according to claim 4, further comprising a multiply and modulo module arranged to receive $(R_j)\bmod(p')$ values from the first table and to generate and output via a first output $[i \times R_j]\bmod(p')$ 25   where i corresponds to the columns of the data array.

    7. An interleaver according to claim 6, wherein the multiply and modulo module is arranged to generate and output via a second output $[i \times R_j]\bmod(p')$ when operating in the the family of WCDMA standards 30   within 3GPP2.

AMENDED SHEET (ARTICLE 19)

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8. An interleaver according to any preceding claim wherein a rate of received interleaved addresses to the buffer is responsive to a relationship between valid and invalid addresses.

10   9. An interleaver according to any preceding claim wherein a size of the buffer is responsive to a relationship between valid and invalid addresses.

10. An interleaver according to any preceding claim wherein the buffer is
15   adapted to avoid introducing irregularity into the timing of the output of the interleaved address.

11. An interleaver for a turbo encoder and decoder comprising at least one component adapted to provide valid and non-valid interleaved
20   addresses and a buffer arranged to store valid addresses and to output valid addresses at substantially constant rate, wherein the buffer is adapted to compare received interleaved addresses with the size of the data array to determine a validity of a received address.

25   12. An interleaver according to claim 11 wherein the at least one component comprises a row counter.

13. An interleaver according to any claim out of claims 11-12 wherein the buffer is arranged to control the flow of data into the interleaver, such
30   that when a predetermined number of addresses have been stored in the buffer the buffer stops the flow of data into the interleaver.

AMENDED SHEET (ARTICLE 19)

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14. An interleaver according to any claim out of claims 11-13 wherein a rate of received interleaved addresses to the buffer is responsive to a relationship between valid and invalid addresses.

15. A turbo decoder comprising an interleaver according to any

10   preceding claim and a processor arranged to populate the first table and second table with the first set of parameters and the second set of parameters respectively when operation in the first wireless communication standard is required and to populate the first table and the second table with the third set of parameters and the fourth

15   set of parameters respectively when operation in the second communication standard is required.

16. A turbo encoder comprising an interleaver according to claims 1 to 9 and a processor arranged to populate the first table and second table ·

20   with the first set of parameters and the second set of parameters respectively when operation in the first wireless communication standard is required and to populate the first table and the second table with the third set of parameters and the fourth set of parameters respectively when operation in the second

25   communication standard is required.

17. A method for interleaving in a turbo encoder and decoder comprising populating a first table with a first set of parameters to allow intra-row permutation of data within an array in accordance with a first wireless

30   communication standard when operation in the first wireless communication standard is required and populating a second table with a second set of parameters to allow inter-row permutation of the data in accordance with the first wireless communication standard when operation in the first wireless communication standard is

required and populating the first table with a third set of parameters to allow intra-row permutation of data within an array in accordance with a second wireless communication standard when operation in the second wireless communication standard is required and populating the second table with a fourth set of parameters to allow inter-row permutation of the data in accordance with the second wireless communication standard when operation in the second wireless communication standard is required; comparing received interleaved addresses with the size of the data array and storing in a buffer valid addresses; and controlling the flow of data into the interleaver, such that when a predetermined number of addresses have been stored in the buffer the buffer stops the flow of data into the interleaver to allow the outputting of addresses from the buffer to be performed at substantially a constant rate.

18. The method according to claim 19 wherein a rate of received interleaved addresses to the buffer is responsive to a relationship between valid and invalid addresses.

19. ~~The method according to any claim out of claims 19-20 wherein a~~ size of the buffer is responsive to a relationship between valid and invalid addresses.

20. An interleaver substantially as herein described with reference to the accompanying figures.

21. A method for interleaving substantially as herein described with reference to the accompanying figures.

AMENDED SHEET (ARTICLE 19)